

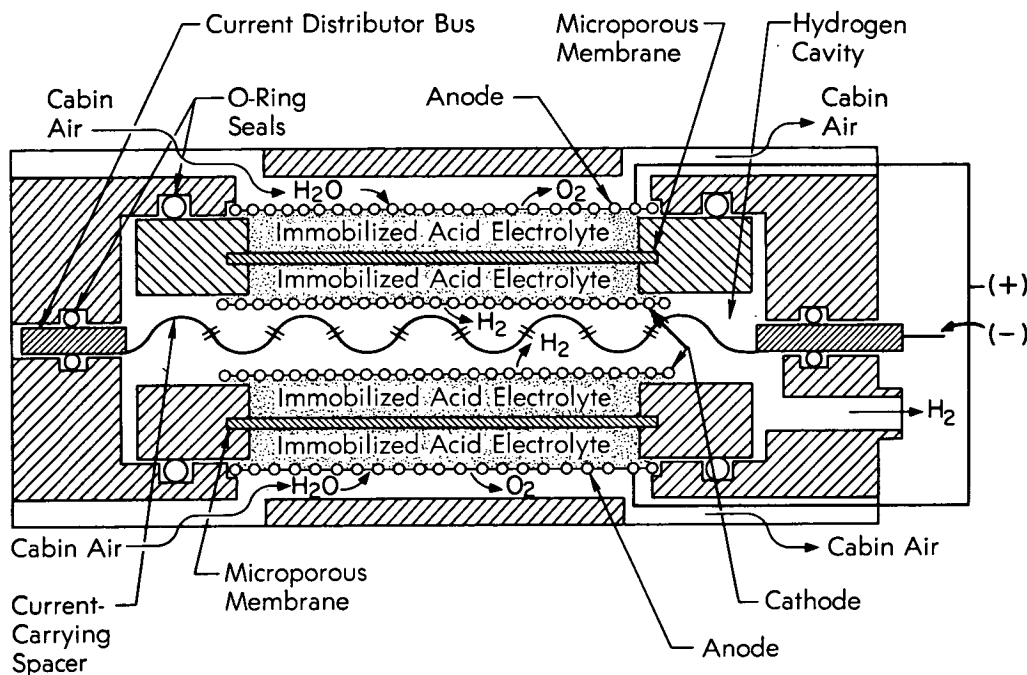
NASA TECH BRIEF

Ames Research Center



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Cell for Electrolysis of Water Vapor



The problem:

To regenerate oxygen from the water vapor that is in the air of a closed-loop life-support system.

The solution:

Electrolytic cells which remove water vapor from air circulated through them; the water is converted into oxygen and hydrogen, and the oxygen is returned to the air. The hydrogen is vented or used elsewhere.

How it's done:

The electrolytic cells are packaged in pairs, as indicated in the diagram. The cathodes of the two

cells are metal screens which form the sides of a common hydrogen cavity. A thin corrugated metal spacer in contact with the cathodes serves as a current-carrying element. Each anode is also made of metal mesh or screen, one side of which is in contact with the electrolyte; the other side is exposed to a flow of air from the life-support circulating system.

The cathode electrolyte compartment of each cell is separated from the anode electrolyte compartment by a microporous membrane. The ionized species in the compartments are derived from sulfuric acid, and since the cells must operate in any position and in gravity-free space, the electrolyte is immobilized by

(continued overleaf)

absorption in a matrix of fumed silica (the combination forms a thick gel). Concentrated solutions of sulfuric acid are hygroscopic; thus, when moist air is passed over the immobilized electrolyte, the water content of the air is largely taken up by the acid and made available for electrolytic action. Oxygen formed by electrolysis at the anode mixes with the flow of air; as a result, air rich with moisture flows into one end of the cell and comes out reduced in moisture and enriched in oxygen. Hydrogen formed in the central core of the cell combination is led out to be used for power in the spacecraft or vented.

The moisture present in cabin atmospheres is derived from the metabolic processes of the crew as well as from other processes; a suitable number of pairs of cells of the type shown can be used to provide a large part of the oxygen required by the crew and to maintain the cabin atmosphere at comfortable humidity levels.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
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Patent status:

No patent action is contemplated by NASA.

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